

In recent years, the use of recycled plastic aggregate (RPA) as an alternative aggregate material has been considered to lower the environmental influence of both concrete and waste of plastics. Recycled plastic aggregate concrete (RPAC) is now known as a highly promising technology that can contribute to resource efficiency in the construction industry.

The first experimental study of the properties of concrete manufactured using recycled Polyethylene terephthalate (PET) Flake aggregates is presented. Five batches of concretes were manufactured with different PET contents (1%, 3%, 5%, 7%, 10%) by the weight of Portland cement. The effect of RPA content on the compressive strength, flexural strength, splitting tensile strength and hardened density of each batch is noted. The results showed that the use of PET at 1% lead to increase the compressive strength in 58% compared to the reference batch (made without waste). Flexural strength results showed that the use of PET at 1%, 3% increases the values flexural strength in 23.11%, 25.59 respectively comparing with reference batch. Also, the ratio 1% of PET gives the optimum value of splitting tensile strength with increment ratio 130%. The density values clearly decreased with increasing the percentage of PET content, the decreasing ratio of density close to 14% especially at 10% of PET.

Therefore, it's a good idea to invest the plastic waste and produce concrete with lower density compared to the conventional concrete. By this way, we protect the environment from the negative effect of plastic waste at the same time it can be produce a new cementitious product with low cost and improved properties. Also, it can be concluded that adding the plastic waste type (PET) to the cement mortar lead to increase the mechanical properties of this mortar at a particular content of PET. Also, it is found that the ratio (1wt.%) of PET gives the optimum values of compressive and splitting tensile strengths while the weight percent (7%) of PET increases the flexural strength up to 37.93%.



Fig. 1. (a) Polyethylene terephthalate (PET) waste cup before cutting (b) polyethylene terephthalate (PET) after cutting.



Fig (2) Cement Products with different weight percentages of PET waste after casting and drying